

To: THE APPEAL AUTHORITY: THE HONOURABLE MINISTER DESIGNATED UNDER SECTION 45 OF THE NATIONAL NUCLEAR REGULATOR ACT, 1999.

Licence reference number: *NIL – 01 (Variation 21)*

Ex Parte:

SOUTHERN AFRICAN FAITH COMMUNITIES' ENVIRONMENT INSTITUTE

Appellant

APPEAL: AUTHORISATION IN TERMS OF THE NATIONAL NUCLEAR REGULATOR ACT,
1999:

LONG TERM OPERATION OF UNIT 1 OF THE KOEBERG NUCLEAR POWER STATION AT
DUYNEFONTEIN, WESTERN CAPE PROVINCE UNTIL JULY 2044

Contents

| | |
|--|-----------|
| 1. EXECUTIVE SUMMARY | 3 |
| 2. LEGAL FRAMEWORK..... | 7 |
| 3. GROUND OF APPEAL 1 – FAILURE TO COMPLY WITH REGULATION 3(3), 4(B), 4 (C), 5, AND 6(3) OF THE REGULATIONS FOR LONG TERM OPERATION | 12 |
| 3.1 INTEGRITY OF THE CONTAINMENT STRUCTURE | 13 |
| (A) SUMMARY | 13 |
| (B) CHLORIDE INDUCED CORROSION | 14 |
| (C) ESKOM DELAYS IN IMPLEMENTING ICCP | 16 |
| 3.2 MONITORING OF THE CONTAINMENT STRUCTURE | 22 |
| (A) INTEGRATED LEAK RATE TESTING (ILRT) | 28 |
| (B) SUBMISSION | 30 |
| 3.3 NON-COMPLIANCE WITH LTO REGULATION 6(3) | 31 |
| 4 GROUND OF APPEAL 2 – RELIANCE ON OUT-OF-DATE DOCUMENTS | 32 |
| 5 GROUND OF APPEAL 3: THE GRANTING OF A 20 YEAR EXTENSION OF LIFE FOR THE KNPS UNIT 1 IS UNCONSTITUTIONAL AND IRRATIONAL | 37 |
| (A) UNLAWFULNESS | 38 |
| (B) CONSTITUTIONALITY - UNREASONABLENESS | 38 |
| (C) RATIONALITY | 43 |

1.

This is an appeal against the decision taken by the National Nuclear Regulator Board of Directors varying the Nuclear Installation Licence No. NIL-01 (Variation 20)¹, granted to Eskom for the siting, construction, operation and decommissioning of the Koeberg nuclear power station (KNPS) in terms of section 21 of the National Nuclear Regulator (NNR) Act², authorising Eskom to continue to operate Unit 1 of the KNPS for a further twenty year period, with conditions, until 21 July 2044 (“the Decision”).

2.

The decision was taken in terms of section 23 of the National Nuclear Act (“NNR Act”) on 15th July 2024 and the variation issued on 19th July 2024. This appeal is brought in terms of section 45 of the NNR Act.

3.

The appellant contends that the decision to vary the licence and grant the authorisation for a further 20 year period of operation for Unit 1 was fatally flawed and falls to be set aside in this appeal. A failure to do so will render any appeal decision similarly flawed and subject to being set aside on review in Court.

4.

The appellants made extensive submissions during the LTO process to the National Nuclear Regulator. These written submissions are referred to extensively in this appeal. They contain the appellant’s detailed objections to the application, and in turn inform the reasons for this appeal because it is apparent that the decision to extend the licence for the KNPS did not address many of the concerns raised in these submissions. These included the following submissions, and their contents should be read with this appeal memorandum:

¹ Granted to Eskom for the siting, construction, operation and decommissioning of the nuclear installation known as KOEBERG “A” NUCLEAR POWER STATION, situated on the site of Cape Farm No. 34, also known as Duynefontein, in the magisterial district of Malmesbury in the Western Cape

² Act No. 47 of 1999

SAFCEI – LTO Application – *REPRESENTATIONS ON ESKOM KOBERG NUCLEAR POWER STATION (KNPS) LONG TERM OPERATION (LTO) - 16 March 2023* (attached hereto marked Annexure “A”);

SAFCEI – LTO Application - *REPRESENTATIONS ON ESKOM KOEBERG NPS NUCLEAR POWER STATION (KNPS) LONG TERM OPERATION (LTO) APPLICATION - UNREDACTED LTO SAFETY CASE - 30 January 2024*
(attached hereto marked Annexure “B”);

SAFCEI – LTO Application - *REPRESENTATIONS ON ESKOM KOBERG NUCLEAR POWER STATION (KNPS) LONG TERM OPERATION (LTO) APPLICATION - 7 June 2024*
(attached hereto marked Annexure “C”).

5.

1. EXECUTIVE SUMMARY

The decision of the NNR to authorise the operation of Unit 1 of the KNPS for a further 20-year period until 21 July 2044 is appealed on the basis of it being unlawful for the following reasons:

- (i) The application for long term extension of the licence did not comply with the LTO regulations.
- (ii) The NNR failed to consider relevant considerations and considered irrelevant considerations, specifically out-of-date documents contained in the LTO application.
- (iii) The decision is irrational and unconstitutional.

6.

LTO Regulations:

Documentation supporting the LTO application including the Safety Case did not “*demonstrate that the regulatory requirements for LTO are met and that it is safe to continue operating the*

KNPS for an additional 20 years, from 2024 to 2044 (Unit 1) (and 2045 (Unit 2)).”³ This applies especially to areas critical to defence-in-depth, namely integrity of the reactor containment structure; and the ability to monitor containment structural integrity, and internal pressure and temperature. This is because all the necessary repairs, tests, and analyses fundamental thereto had not been completed and checked for compliance prior to the determination of the LTO application. These include necessary repairs that had been identified by Eskom as far back as 2015, and confirmed in the SALTO report⁴ of 2022, including the installation of an impressed current cathodic protection (ICCP) system, and a fully functioning monitoring system.

7.

The installation of ICCP has for the last ten years been identified by Eskom experts as being essential to ensure the long-term safety and integrity of the reactor's containment structure⁵ and was therefore a critical issue for consideration in the LTO Safety Case, submitted by Eskom in support of its application for long term operation. This system was not in place prior to the granting of the authorisations for a further 20 years for Unit 1 which means that the application for long term operation could not demonstrate continued safe operation of the nuclear installation for the period of LTO as required by regulation 3, 4 and 5 and the NNR has therefore granted this authorisation unlawfully. It should be set aside.

8.

The NNR decision to allow Unit 1 to continue to operate for a further 20 years is unlawful because it has been made without there currently being a properly functioning monitoring system that can reliably monitor what is happening inside the containment building at all times. The updated SALTO report of September 2024 confirms that these repairs remain outstanding. A nuclear power station is an inherently highly hazardous installation and requires a fully functional containment monitoring system at all times, for the purpose of

³ Safety Case for Long-Term Operation of Koeberg Nuclear Power station page 7

⁴ IAEA REPORT OF THE SAFETY ASPECTS OF THE LONG-TERM OPERATION MISSION(SALTO) TO THE KOEBERG NUCLEAR POWER PLANT UNITS 1 AND 2 SOUTH AFRICA 22=31MARCH 2022

⁵ Erler, B. A., Weyers, R. E., Sagues, A., Petti, J. P., Berke, N. S., & Naus, D. J. (2011). *Nuclear containment steel liner corrosion workshop: final summary and recommendation report* (No. SAND2010-8718). Sandia National Laboratories (SNL), Albuquerque, NM, and Livermore, CA (United States). <https://www.osti.gov/servlets/purl/1034892>

detecting and correcting any abnormal condition before it can give rise to significant consequences for safety. The absence thereof is concerning, in that defence-in-depth is undermined and consequences for safety could be severe, including a worst-case scenario release of radiation. This is aggravated by the fact that the licence variation permits this state of affairs to continue until an indeterminate date, to be determined by Eskom when outages 129 and 229 will take place.

9.

Without a fully functioning monitoring system the LTO application could not justify the continued safe operation of the reactor for the intended period of time, as Eskom is not in a position to all times predict what is going on in the reactor. Eskom was thus not in a position to present an analysis of containment safety to the NNR without this system, and hence its LTO Safety Case was not compliant with LTO regulation 3(3), 4(b) and (c). As a consequence the NNR was not able to apply its mind to the issues that it must consider in terms of LTO regulation 5. The authorisation was therefore unlawful, for non-compliance with mandatory regulatory requirements under the NNR Act.

10.

Relevant considerations:

The NNR failed to consider relevant considerations and considered irrelevant considerations, specifically out-of-date documents contained in the LTO application. The decision is therefore reviewable in terms of section 6 of the Promotion of Administrative Justice Act (PAJA).⁶

11.

Rationality and constitutionality

The authorisation granted for Unit 1 of the KNPS to operate for a further 20 years in the face of these significant safety concerns is administrative action that is not rationally connected to the power granted to the NNR, which is to provide for the protection of persons, property and the environment against nuclear damage through the establishment of safety standards and

⁶ Act 3 of 2000; Section 6(2): A court or tribunal has the power to judicially review an administrative decision if ...

(e) the action was taken..

(iii) because irrelevant considerations were taken into account or relevant considerations were not considered;....

regulatory practices and to exercise regulatory control related to safety through the granting of nuclear licences.⁷ It is accordingly irrational and unlawful

12.

Given the deficiencies set out above, the decision to authorise the long term operation of Unit 1 of the KNPS falls short of being a reasonable measure as envisaged in section 24 of the Constitution. South Africa fails to meet international best practice the authorisation of the further 20 years of operation of Unit 1 disregards international law. Under the circumstances it is unreasonable and unconstitutional.

13.

The long term extension of the license for KNPS's Unit 1 should therefore not have been granted and should be set aside on appeal.

14.

The appellant, SAFCEI, is a non-profit company incorporated under the company law of South Africa and a registered Public Benefit and Non- Profit Organisation. It brings this appeal:

- (i) in its own interests, as contemplated in section 38(b) of the Constitution. It is an organisations primarily concerned with environmental, social-economic, and social justice issues. The procedurally unfair, irrational, and unlawful decision by the NNR in authorising the continued operation of Unit 1 of the KNPS adversely affects its very reason for existence;
- (ii) in the public interest, as contemplated in section 38(d) of the Constitution: the fairness and lawfulness of the decision and the decision-making process to extend the licence for the Unit 1 of the KNPS for a further 20 years raises issues of the highest public and constitutional importance, including public safety, in which all South Africans have an interest.

⁷ NNR Act, Section 5.

15.

SAFCEI and its members are adversely affected by the decision to authorise the operation of Unit 1 for a further 20 years, as the decision violates the constitutional right to environment of SAFCEI members, as well as their right to fair administrative action. In addition, given that the decision to licence Unit 1 of the KNPS may compromise public safety, as set out in this appeal, SAFCEI members may be directly harmed as a result of the release of radioactive material should an abnormal incident occur during the licence period and thereafter during decommissioning.

16.

2. LEGAL FRAMEWORK

Acronyms:

LTO – long term operation

TAA – time limited aging analysis

NNR – National Nuclear Regulator

The decision must comply with the NNR Act and regulations for Long Term Operation (LTO), and must be rational, and a reasonable measure as envisaged by section 24 of the Constitution.⁸

[In this appeal, certain text is underlined for emphasis.]

17.

NNR Act and regulations

The preamble to the NNR Act⁹ states that the purpose of the NNR is:

⁸ Section 24 of the South African Constitution states that everyone has the right

- a) To an environment that is not harmful to their health and well being; and
- b) To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that
 - (i) Prevent pollution and ecological degradation.
 - (ii) Promote conservation; and
 - (iii) Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development

⁹ Act 47 of 1999

To provide for safety standards and regulatory practices for protection of persons, property and the environment against nuclear damage; and to provide for matters connected therewith.

18.

The NNR Act states the objects¹⁰ of the regulator are to:

- (a) provide for the protection of persons, property and the environment against nuclear damage through the establishment of safety standards and regulatory practices;
- (b) exercise regulatory control related to safety over-
 - (i) the siting, design, construction, operation, manufacture of component parts, and decontamination, decommissioning and closure of nuclear installations; ... through the granting of nuclear authorisations;

19.

The requirements for the long-term operation of the KNPS are contained in the regulations promulgated under the NNR Act for the Long-Term Operation of Nuclear Installations¹¹ (LTO regulations) and are required to be applied by the NNR to the application for long term operation.

20.

In terms of regulation 3 of the LTO regulations:

3. (1) Any licensee wishing to operate a nuclear installation beyond an established timeframe defined in the respective nuclear installation licence shall lodge, in terms of section 21(1) of the Act, an application for the operation of the respective nuclear installation beyond an established timeframe with the Chief Executive Officer of the

(3) The application shall be supported by a safety case to demonstrate continued safe operation of the nuclear installation for the period of Long Term Operation and the safety case shall be submitted within the timelines specified by the Regulator.

¹⁰ Section 5

¹¹ National Nuclear Regulator Act, 1999 (Act No.47 Of 1999): Regulations On The Long Term Operation Of Nuclear Installations NO. R. 266 26 March 2021 published in No. 44394 GOVERNMENT GAZETTE, 26 March 2021

21.

Overview

The following provisions of the LTO Regulations are relevant to the arguments made in this appeal:

"ageing management" means engineering, operations and maintenance actions to control within acceptable limits, the ageing degradation of structures, systems and components;

"safety case" means a logical and hierarchical set of documents that demonstrates compliance with the Regulatory requirements and criteria and describes the radiological hazards in terms of a nuclear installation, site and the modes of operation, including potential undesired modes. It encompasses the authorisation basis, and safety related documentation applicable during different authorisation stages and will include the safety assessment, operational safety related programmes and supporting documentation; and "safety related programmes" collectively refers to all nuclear safety related activities conducted during the operational phase of the nuclear installation and may also be applicable during interim authorisation stages.

22.

The requirements to be demonstrated by the safety case are set out in the LTO regulations, as follows (underline added for emphasis):

- 4 (a) demonstrate compliance with relevant regulatory safety criteria and requirements;
- (b) be prepared using the results of safety analyses, with due consideration of the ageing of structures, systems and components and the periodic safety review;
- (c) provide an overall assessment of the safety of the nuclear installation and justification for continued safe operation for the intended period of Long Term
- (d) demonstrate availability of financial and human resources as well as knowledge management for the period of Long Term Operation, which knowledge management shall include an integrated, systematic approach to identifying, managing and sharing an organisation's knowledge and enabling groups of people to collectively create new knowledge to help achieve the organisation's objectives;
- (e) identify necessary safety improvements which may include, but are not limited to, refurbishment, provision of additional structures, systems and components and additional safety analyses and engineering justifications, to ensure that the licensing basis remains valid during the period of LTO.

23.

Factors which must be considered by the NNR when deciding an application for LTO, and which are therefore mandatory relevant considerations for lawful administrative action as contemplated in section 6(2)(e)(iii) of PAJA are provided in regulation 5, and include but are not limited to the following:

- 5 (a) Safety related programmes relevant for ensuring the safe Long Term Operation of the nuclear installation beyond the timeframe established by the current licensing basis or the nuclear installation licence:
- (b) effectiveness of the ageing management programme necessary for ensuring that required safety functions of structures, systems and components are fulfilled over the period of Long Term Operation of the nuclear installation;
- (c) revalidation of the time limited ageing analyses to ensure continued acceptability of the analysed structures, systems or components for the planned period of Long Term Operation.
- (d) utilisation of the results of the Periodic Safety Review to justify the continued long term operation of the nuclear installation.

24.

The LTO regulations also set out requirements for a program for long term operation which include that:

- 6(3) The licensee shall develop and implement a comprehensive programme for ensuring the safe Long Term Operation of the nuclear installation beyond the time - frame established by the design limits in the current licensing basis or the nuclear installation licence

25.

Constitutional Issues

Section 24 of the Constitution (the right to an environment that is not harmful to health and well-being), applies to the NNR decision to extend the life of Unit 1 of the KNPS, as this decision potentially significantly impacts on the environment and the health and well-being

of significant numbers of people who live in the vicinity of the plant.

26.

Under section 39(1) of the Constitution, international law must be considered when the rights in the Bill of Rights are interpreted, in this case right to an environment that is not harmful to health and well-being. Section 39(2) of the Constitution of the Republic of South Africa, 1996 directs that when any legislation is interpreted, the result must be a construction that promotes “the spirit, purport and objects of the Bill of Rights”.

27.

Safety standards under the International Atomic Energy Agency

South Africa is a member state of the International Atomic Energy Agency (IAEA) and has ratified the Convention on Nuclear Safety. The Convention places certain obligations on member states to implement measures aimed at ensuring nuclear safety. The NNR Safety Standards are premised on international standards such as the IAEA Safety Standards, the UN NII Safety Principles and the WENRA Reference levels.¹²

28.

The IAEA safety standards are therefore international law which must be considered when the NNR decision to extend the licence for Unit 1 of the KNPS is evaluated for reasonableness as envisaged in section 24 of the Constitution.

29.

The IAEA SALTO (Safety Aspects of Long-Term Operation) peer review is a comprehensive safety review directly addressing strategy and key elements for the safe long-term operation of nuclear power plants. The evaluation of programmes and performance is made on the basis of the IAEA’s Safety Standards and other guidance documents.¹³ The key objectives of the SALTO peer review include to provide the host organization with an objective assessment of

¹² NNR website: <https://nnr.co.za/about/policy-and-legislation/>

¹³ <https://www.iaea.org/services/review-missions/safety-aspects-of-long-term-operation-salto>



the status of the preparedness for LTO with respect to international nuclear safety standards.¹⁴

This is information that is clearly critical to the determination of whether the LTO safety case can demonstrate continued safe operation of the nuclear installation for the period of the LTO as envisaged by LTO regulation 3(3).

30.

Non-compliance with the above requirements, in particular those that are underlined, will be the focus of this appeal.

31.

3. GROUND OF APPEAL 1 – FAILURE TO COMPLY WITH REGULATION 3(3), 4(b), 4 (c), 5, and 6(3) OF THE REGULATIONS FOR LONG TERM OPERATION

The LTO Safety Case prepared and submitted by ESKOM to the NNR stated that it was compliant in that it *“demonstrates that the regulatory requirements for LTO are met and that it is safe to continue operating for an additional 20 years, from 2024 to 2044 (Unit 1) and 2045 (Unit 2).”*¹⁵ However during the public participation process SAFCEI submitted that this conclusion was not supported by the LTO Safety Case.¹⁶ This submission appears to have been ignored. This appeal reiterates - and amplifies - previous SAFCEI submissions that the documentation supporting the LTO application including the Safety Case did not demonstrate that the regulatory requirements for LTO are met and that it is safe to continue operating for an additional 20 years, from 2024 to 2044 (Unit 1) (and 2045 (Unit 2)).¹⁷

¹⁴ https://www.iaea.org/sites/default/files/17/01/salto080615_how_to_prep_brochure.pdf

¹⁵ Safety Case for Long-Term Operation of Koeberg Nuclear Power station page 7

¹⁶ Submission dated 30 January 2023: SAFCEI – REPRESENTATIONS ON ESKOM KOBERG NPS NUCLEAR POWER STATION (KNPS) LONG TERM OPERATION (LTO) APPLICATION – UNREDACTED LTO SAFETY CASE, paragraph 2

¹⁷ Safety Case for Long-Term Operation of Koeberg Nuclear Power station page 7

32.

This appeal will focus on the areas critical to defence-in-depth, namely:

- (i) integrity of the reactor containment structure;
- (ii) ability to monitor containment structural integrity, and internal pressure and temperature.

It is submitted that the Safety Case and other documents supporting the LTO application show that several features of safety management at Koeberg have not been demonstrated to meet the requirements on which defence-in-depth depends for the further 20 years granted for Unit 1 to operate, that is until July 2044, because all the necessary repairs, tests, analyses, and updates to documents fundamental thereto had not been completed and checked for compliance prior to the determination of the LTO application. These necessary upgrades had been identified by Eskom as far back as 2015 and confirmed in the SALTO report¹⁸ of 2022.

33.

The long term extension of the license for KNPS's Unit 1 should therefore not have been granted and should be set aside on appeal.

34.

The three areas identified above will be discussed in detail in the paragraphs that follow.

35.

3.1 INTEGRITY OF THE CONTAINMENT STRUCTURE

(a) Summary

In its application for LTO, Eskom proposed that significant maintenance and repairs critical to ensuring safety and defence-in-depth at the KNPS could be delayed until after the LTO licence is granted, and this approach was accepted by the NNR in its licensing decision for Unit 1. The

¹⁸IAEA REPORT OF THE SAFETY ASPECTS OF THE LONG-TERM OPERATION MISSION(SALTO) TO THE KOEBERG NUCLEAR POWER PLANT UNITS 1 AND 2 SOUTH AFRICA 22=31MARCH 2022

result is that Information that is critical to analysing reactor safety so as to enable the proper functioning of the defence-in-depth measures will only be available years after the LTO licence is granted, at a date to be determined at Eskom's discretion.

36.

These delays mean that without this information and analysis, the LTO Safety Case was not able to be prepared on the basis of safety analyses that would have enabled it to comply with regulation 3(3) and 4(c) – which is to provide *an overall assessment of the safety of the nuclear installation and justification/demonstration for continued safe operation for the next 20 years*, the intended period of long-term operation.

37.

The consequence hereof is that the NNR was not able to apply its mind to all of the mandatory considerations provided for in regulation 5, particularly 5(a), and therefore could not authorize this application in a manner compliant with the requirements for lawful administrative action set out in section 6(2)(e)(iii) of PAJA.¹⁹ Accordingly the license variation authorizing a further 20 years of operation for Unit 1 should be set aside, and no application for LTO should be considered until these repairs have been completed and tested with fully functional monitoring systems.

38.

(b) Chloride induced corrosion

The long-term operation of a nuclear reactor with containment buildings showing signs of chloride-induced corrosion but lacking an impressed current cathodic protection (ICCP) system poses significant risks. The following is a summary of concerns reflected in documentation supporting the LTO application:²⁰

¹⁹ Act 3 of 2000; Section 6(2): A court or tribunal has the power to judicially review an administrative decision if ...

(e) the action was taken..

(iii) Because irrelevant considerations were taken into account or relevant considerations were not considered;...

²⁰ See *KBA 0022 N NEPO LOPP 164 Rev 3 and d*

- Structural Integrity is Compromised: Chloride-Induced Corrosion: Chlorides aggressively attack the steel reinforcement within the concrete, leading to rust formation. This rust expands and exerts pressure on the surrounding concrete, causing cracking, spalling, and eventual weakening of the structure. Over time, this degradation can severely compromise the structural integrity of the containment building, which is critical for preventing the release of radioactive materials in the event of an incident.
- Increased Risk of Containment Failure: Without ICCP, there is no active measure to mitigate or slow down the ongoing corrosion. ICCP is designed to protect steel reinforcement by providing a continuous electric current that prevents the steel from corroding. The absence of such a system allows corrosion to progress unchecked, increasing the likelihood of containment failure, especially during seismic events or other stresses.
- The ultimate function of the containment building is to act as a barrier against the release of radioactive materials. A compromised structure due to unchecked chloride-induced corrosion increases the risk of a containment breach in a worst-case scenario, potentially leading to a radiological release that could have catastrophic environmental and public health consequences.

39.

Operating a nuclear reactor under these conditions presents a significant public safety and environmental risk. The absence of an ICCP system to counteract chloride-induced corrosion leaves the containment building vulnerable to further degradation, potentially compromising its ability to protect against radiological hazards. Proactive measures, including the installation of ICCP, are essential to ensure the long-term safety and integrity of the reactor's containment structure²¹ and therefore a critical issue for consideration in the LTO Safety Case, submitted by Eskom in support of its application for long term operation. Clearly the absence of an ICCP system in place prior to the granting of the authorisations for a further 20 years means that the application for long term operation could not demonstrate continued safe operation of

²¹ Erler, B. A., Weyers, R. E., Sagues, A., Petti, J. P., Berke, N. S., & Naus, D. J. (2011). *Nuclear containment steel liner corrosion workshop: final summary and recommendation report* (No. SAND2010-8718). Sandia National Laboratories (SNL), Albuquerque, NM, and Livermore, CA (United States). <https://www.osti.gov/servlets/purl/1034892>

the nuclear installation for the period of LTO as required by regulation 3(3) and the NNR has therefore granted this authorisation unlawfully. It should be set aside.

40.

(c) Eskom delays in implementing ICCP

The LTO application shows that Eskom has failed to make the necessary preparations which would enable its defence-in-depth program to be assessed beyond the expiry of the licence ending in July 2024, in regard to the issue of integrity of the containment buildings. These failures are not in dispute and were evident to Eskom as a result of its expert panel report in 2015,²² to the IAEA in its 2022 SALTO mission, and from reports of the ESKOM PLANT ENGINEERING LIFE OF PLANT PLAN: CONTAINMENT BUILDINGS reports of 2022 and 2024.²³ However, proposed ICCP system is still in the “testing and design phase” according to the NNR record of public participation dated 11 July 2024.²⁴

41.

The urgency of the situation was evident to Eskom in 2015, which is almost a decade ago, as highlighted by the following statement at the beginning of the expert panel report after a workshop of the panel was held in Cape Town during the week of 03 – 07 November 2014. During the workshop the Panel performed a site visit at KNPS, met with Eskom representatives to discuss project requirements and developed a suitable repair system solution which would protect the containment structures over the extended life of the power station, calculated to be 40 years from 2015.²⁵

It was concluded that:

- The containment structures are at a very advanced state of reinforcement corrosion damage and future reinforcement corrosion damage in presently unrepaired areas is expected to develop exponentially with time and result in more widespread delamination.

²² Long Term Repair Strategies for the Containment Buildings - Expert panel report 2015: JN465-NSENSE ESKB-R-5704 at page 2.

²³ KBA 0022 N NEPO LOPP 164 Rev 3 Paragraph 4.3.1

²⁴ NNR Report: Representations received during the NNR Public Consultation for the Koeberg LTO Application NNR - Record TR-NPP-24-003

²⁵ Long Term Repair Strategies for the Containment Buildings - Expert panel report 2015: JN465-NSENSE ESKB-R-5704 at page 2.

- The end of the operational service life of the containment structures may be reached soon if future corrosion damage is not prevented through the application of a long-term repair solution.
 - The presently specified patch repair methodology follows state-of-the-art procedures and good practice for localised zones of degradation but will not provide protection to the overall containment structures for the required remaining service life of 40 years.
 - The only available repair method identified which can meet the defined performance criteria for the containment structures is cathodic protection using impressed current. Design and implementation of a CP system for such important structures should only be undertaken by internationally qualified companies.
 - Routine monitoring and periodical testing of the cathodic protection system must be carried out. Maintenance and possible replacement of the system over the extended lifespan will be required.
 - The repair strategies developed for the containment structures may or may not be suitable for other structures at KNPS. Suitable repair strategies should be developed for each individual structure based on individual condition assessments and performance requirements.
- It is strongly recommended that a long term protection system, in the form of impressed current cathodic protection, be implemented on both containment structures immediately after completion of local repairs.

42.

The report strongly recommended the following steps to be taken *“immediately after completion of local repairs”* ie soon thereafter:²⁶

16. RECOMMENDATIONS The expert panel is unable to provide any estimation as to the period that the containment buildings will still be able to meet their design basis due to the advanced state of chloride ingress and rebar corrosion measured and observed on Unit 2. These measurements and local repairs must still be undertaken on Unit 1 containment. It is therefore strongly recommended that a long term protection system, in the form of impressed current cathodic protection, be implemented on both containment structures immediately after completion of local repairs.

43.

Eskom has had almost a decade to deal with a problem described in 2015 as a *“very advanced state of reinforcement damage”* but inexplicably has failed to do so. This conduct shows a disturbing trend by Eskom of delaying repairs - that are safety related - in a major highly hazardous installation.

44.

The PLANT ENGINEERING LIFE OF PLANT PLAN: CONTAINMENT BUILDINGS report of 2022

²⁶ Id page 41

stated that the long-term permanent solution to the main structural threat to these buildings through chloride corrosion is the installation Impressed current cathodic protection (ICCP). The report states that these repairs were **mandatory for the life extension of the containment structures to achieve a 60 year operating life.**²⁷ The report concludes that:

The main structural threat for the buildings (Chloride induced corrosion), is a **known and active threat**. This will lead to the degradation of the structures to a point where they have to be decommissioned, if no long-term modifications are implemented. ICCP has to be implemented as a matter of urgency to ensure the structures remain functional for the remainder of the power station life plus plant life extension.²⁸

45.

However the LTO Safety report²⁹ appears to contradict these recommendations. Notably it referred to a leak rate test that is by now 9 years old, and arguably out-of-date:

The LTO assessment identified some SSCs important to safety with ageing mechanisms that posed a risk if not treated in a timely manner, namely, containment buildings, aseismic bearings, cables, and switchboards. The containment buildings are subject to chloride-induced reinforcement corrosion. The proposed solution is to implement an impressed current cathodic protection (ICCP) system into the concrete of the containment buildings to neutralise the corrosion effects of chlorides. The containment buildings are acceptable for operation at present based on current surveillance monitoring results. An integrated leak rate test (ILRT) was completed in 2015 (on both units), and the containment buildings' safety analysis (time-limited ageing analysis) determined that the structural integrity of the containment buildings was ensured for the planned LTO period. The ILRT will continue to be conducted in line with the requirements of the ageing management programme for the buildings. The ICCP modification and the next scheduled ILRT are included in the LTO Implementation Plan (IP).

46.

Although this corrosion of the containment buildings was regarded as urgent as far back as 2015³⁰ and once again referred to as urgent in this report of 2022, the LTO license has been granted on the basis that the ICCP repair work will be completed in 2025 - three years after this dire warning and almost a decade after Eskom's own expert panel had warned of its

²⁷ KBA 0022 N NEPO LOPP 164 Rev 3 Paragraph 4.3.1

²⁸ KBA 0022 N NEPO LOPP 164 Rev 3 paragraph 8.1

²⁹ Safety Case for Long-Term Operation of Koeberg Nuclear Power Station Unique Identifier: 331-618 Revision: 3 Page: 10 of 295

³⁰ Long Term Repair Strategies for the Containment Buildings - Expert panel report 2015: JN465-NSENSE ESKB-R-5704 at page 2.

necessity “immediately after completion of local repairs.”³¹ The NNR decision to authorize the extension of the license was taken two years after the warning that a program “has to be implemented urgently in order to ensure that the **structures remain functional** for the remainder of the power station life extension.” As no urgent repairs have been done to date and the ICCP is still in the design phase, it follows that when the NNR made its decision it was not rational to assume that these structures will remain functional for the period of the life extension, or are even functional at this point in time.

47.

Instead of completing repairs to containment and which were already identified in 2015, and generating a safety analysis for the LTO thereafter, Eskom relied on limited quality data and extrapolations to purportedly explain that the plant containment structure would be safe for the next 20 years.³² The NNR Safety evaluation considered this issue, but due to the non-functioning of the monitoring system it confirmed that the data was inadequate, containing inconsistencies and gaps. See:

“TLAA 301 (containment)

The calculations performed by ESKOM relied on limited quality data as the data originated from the limitation in the monitoring technology available and applicable at the time of design and construction. The data limitations including inconsistencies and gaps prompted Eskom to rely on engineering judgment and data analysis to reinterpret the data. These methods introduced discretionary criteria that are not part of surveillance procedures”³³

48.

However, even with these stated limits of the data used to evaluate the safety of the containment dome, the NNR irrationally concluded that it was safe to operate for 20 more years for Unit 1.

49.

The NNR obviously could not adequately evaluate the state of the containment structures for

³¹ Long Term Repair Strategies for the Containment Buildings - Expert panel report 2015: JN465-NSENSE ESKB-R-5704 at page 2.

³² Outcome of the assessment of the Koeberg Long Term Operation Application - TR-NPP-24-002 (Rev 1) 11 July 2024 at page 19

³³ id

the period of long term operation as the mandatory repairs to the containment structure have not commenced yet. After repair a fully functioning monitoring system will be required in order to generate reliable information about the state of the containment building. (The issue of the failure to repair the containment monitoring system before being granted the authorisation is discussed in more detail below.) The ICCP program is scheduled to be completed in November 2025, but the repairs to containment monitoring system are only scheduled to be completed during outages 129 and 229 takes place, for which there are currently no specified dates. Given Eskom's past practice of delayed maintenance at the KNPS, these repairs and upgrades could take place any time after 2029.³⁴ A proper appraisal of the safety of a repaired KNPS containment structure will thus only be feasible five years from now or even longer, if there are delays.

50.

According to the latest periodic safety report,³⁵ Eskom intends to ensure that the KNPS conforms to “modern codes, standards, and good practices.” The 2022 SALTO report stated:

2.2 – SAFETY CONSEQUENCE: Without a fully functional containment monitoring system, not all necessary data for the containment structure will be available to demonstrate the intended safety function during LTO.³⁶

51.

It follows that ESKOM should have ensured that the LTO safety case was based on completed repairs to the containment structure evaluated by a properly repaired monitoring system, (prior to the extension of authorisation) which would have enabled it to demonstrate continued safe operation for the next 20 years, as required by regulations 3(3):

(3) The application shall be supported by a safety case to demonstrate continued safe operation of the nuclear installation for the period of Long Term Operation and the safety

³⁴ A condition of the licence requires the following repairs to the monitoring system Containment monitoring instrumentation (Linked to IAEA mission finding – Issue area E2) due on Outages 129 and 229. Informal inquiries indicate that outage 129 (Unit 1) is planned for Jan 2029 for 60 days outage 229 (unit 2) is planned for Jan 2030 for 60 days. However these dates and timelines are currently under review and will be finalised once the update production plan is approved. (email 15 August 2024 from Christo Olivier Business Performance Manager Nuclear Operating Unit, Eskom to Tristen Taylor.

³⁵ PSR paragraph 4.1

³⁶ Salto report page 61

case shall be submitted within the timelines specified by the Regulator.

52.

However this did not take place.

53.

Clearly the LTO application was not in a position to provide an assessment of the safety of the nuclear installation and justification for continued safe operation for the intended period of Long Term as required by LTO regulations 3(3) and 4, in particular in regard to the state of the containment structures. As a result, when considering the LTO application the NNR was not able to (ie not in a position to) apply its mind to the mandatory considerations provided for in regulation 5 and therefore could also not apply its mind to all relevant considerations as envisaged in section 6(2)(e)(iii) of the Promotion of Administrative Justice Act (PAJA).³⁷

54.

The public cannot be assured that the repairs to the ICCP will take place by 2025, ten years after initially proposed, given the past delays. The authorisation to allow the plant to operate Unit 1 for a further 20 years in the circumstances fails to comply with the constitutional requirement of being a reasonable measure to protect public health and safety from an inherently hazardous industry. The KNPS containment structure is in an advanced state of disrepair and is critical to defense-in-depth.

55.

The authorisation to operate for a further 20 years in the face of these significant safety concerns is administrative action that is not rationally connected to the power granted to the NNR, which is to provide for the protection of persons, property and the environment against nuclear damage through the establishment of safety standards and regulatory practices and to exercise regulatory control related to safety through the granting of nuclear licences.³⁸ It is accordingly irrational and unlawful.

³⁷ Act 3 of 2000

³⁸ NNR Act, Sections 5(a) and (b)

56.

The revision of the licence for the KNPS must be set aside, and a new LTO application should only be considered when the ICCP has been completed and repairs completed and tested through a properly functional monitoring system.

57.

3.2 MONITORING OF THE CONTAINMENT STRUCTURE

The NNR decision to allow Unit 1 to continue to operate for a further 20 years is also unlawful because it has been made without there currently being a properly functioning monitoring system that can reliably monitor what is happening inside the containment building.

58.

The IAEA SALTO report as to the consequences of the current state of the containment monitoring system is clear:

2.2 – SAFETY CONSEQUENCE: Without a fully functional containment monitoring system, not all necessary data for the containment structure will be available to demonstrate the intended safety function during LTO.³⁹

59.

The IAEA SALTO report made the following recommendation in 2022.⁴⁰

The plant should ensure full functionality of the containment structure monitoring system.

60.

The updated SALTO REPORT of 2024 reiterates this recommendation:⁴¹

The team noted that the plant needs to continue its work to ensure that:

- The plant programmes supporting LTO are fully implemented for the LTO period.

³⁹ Salto report page 61

⁴⁰ SALTO report page 62

⁴¹ <https://www.iaea.org/newscenter/pressreleases/iaea-concludes-long-term-operation-safety-review-at-south-african-koeberg-nuclear-power-plant>

- The containment monitoring system is fully refurbished and remains fully functional during the LTO period.

61.

Being a nuclear power station full functionality of the containment monitoring system should be in place at all times, not at some undetermined time in the future. Without a properly functioning monitoring system the Safety Case did not have the data which would enable it to undertake the required safety analysis envisaged in regulation 4(b) and to:

- (c) provide an overall assessment of the safety of the nuclear installation and justification for continued safe operation for the intended period of Long Term⁴²

62.

This deficiency was brought to the attention of the NNR in submissions by SAFCEI.⁴³ The granting of the extension of the licence in these circumstances is non-compliant with the regulations for LTO and is therefore unlawful.

63.

The result is also concerning, in that defence-in-depth is undermined and consequences for safety could be severe, including a worst case scenario release of radiation. This is aggravated by the fact that the licence variation permits this state of affairs to continue until an indeterminate date, to be determined by Eskom when outages 129 and 229 will take place.

64.

The monitoring and control of pressure inside the reactor vessel is clearly critical to preventing such an unintended release of radiation:

The central safety objective in reactor plant design and operation is limiting the release of radioactive fission products. To ensure that this objective is met, the containment must be designed and maintained so that the fission products are retained after operational and accidental releases inside the containment. The containment temperature, pressure, and combustible gas control systems are those systems which are necessary for reducing the

⁴² Regulation 4(c)

⁴³ Submission of SAFCEI dated 30th January 2024

release of airborne radioactivity and for ensuring continued containment integrity. These containment systems function as necessary during normal operation and during the period following a postulated accident.⁴⁴

65.

The monitoring system for the containment building involves four parts: strain gauges, thermocouples, pendulums and invar wires. The thermocouples, monitor the temperature inside the containment building. The SALTO report observed the fundamental overall problem that the *“containment structure monitoring system is not fully functional”*⁴⁵ and paints a concerning picture:⁴⁶

2.1 - FACTS:

- F1) Temperature monitoring is a precondition for accurate evaluation of results of strain gauges, pendulums and invar wires. However, some thermocouples linked to the strain gauges of containment monitoring system of unit - 1 are not functional. The temperatures were calculated from coil resistances. This method does not provide accurate temperature values.
- F2) Some strain gauges of containment dome of unit 1 are partially out of service and the strain gauges of unit 2 are out of service or are providing erratic values.
- F3) The modification of the containment monitoring system is in the initial stage
- F4) Four pendulums in unit 1 named P2-A, P4-A, P1-B and P3-B show non-realistic behaviour compared to strain gauge evaluations in the same area. According to TLAA 301 (containment reanalysis report), one possible cause of the non-realistic behaviour is concrete repairs in this area with the consequence of corrosion effects. According to TLAA301, these pendulums need to be intrusively examined, refurbished and re-set, which is not completed.

66.

In summary - as thermocouples are not functioning on Unit 1, accurate temperature values are not accurately discernible. Without such, the results of strain gauges, pendulums and invar wires cannot be accurately evaluated and instead, temperatures are being calculated resulting in temperature values that are not accurate.⁴⁷ Basically, these instruments measure

⁴⁴ <https://www.nrc.gov/docs/ML1122/ML11223A222.pdf> - Westinghouse Technology Systems Manual Section 5.4 Containment Temperature, Pressure, and Combustible Gas Control Systems

⁴⁵ SALTO report page 61

⁴⁶ International Atomic Energy Agency, SALTO, pg. 61;

⁴⁷ id



the strain on and the lateral & horizontal displacement of the containment walls, all of which are vital to know what will happen during an accident.⁴⁸

67.

What this quote means is that relying solely on temperatures calculated from coil resistances, without thermocouples to directly monitor the actual temperature inside the containment building, compromises the accuracy and reliability of the containment structure monitoring system, potentially leading to undetected thermal anomalies and failing to ensure full functionality.

68.

It is therefore uncertain whether the containment building can handle a rise in pressure, and if not the consequences could be serious. At Fukushima, the pressure rose higher than the buildings could handle in Units 1, 3 and 4. The pressure led to the release of radioactive gases and hydrogen explosions. At Three Mile Island, the operators had to vent radioactive gases to prevent over-pressurising the containment structure.⁴⁹

69.

The observations contained in F2 to F4 of the SALTO report referred to above show a concerning lack of attention by Eskom to safety.

⁴⁸ Eskom, Plant Engineering: Life of Plant Plan: Containment Buildings, KBA 0022 N NEPO LOPP 164 Rev 1, 2017, pg. 9

⁴⁹ 1) Fukushima - Funabashi, Y., & Kitazawa, K. (2012). Fukushima in review: A complex disaster, a disastrous response. *Bulletin of the Atomic Scientists*, 68(2), 9-21.

<https://journals.sagepub.com/doi/pdf/10.1177/0096340212440359>

2) Three Mile Island

Rogovin, M. (1980). *Three Mile Island: A report to the commissioners and to the public* (Vol. 1250). Nuclear Regulatory Commission, Special Inquiry Group.

https://books.google.com/books?hl=en&lr=&id=vt0ZifCrXoUC&oi=fnd&pg=PA809&dq=Three+Mile+Island+release+overpressure&ots=vwZifCKqUJ&sig=4Oz6W71xsJM-tLkF7_6TfOI37-s



70.

The IAEA SALTO report stated:⁵⁰

The operating organization shall establish surveillance programmes for ensuring compliance with established operational limits and conditions and for detecting and correcting any abnormal condition before it can give rise to significant consequences for safety.

71.

The IAEA SALTO report provides a table of 15 recommendations and suggestions regarding a list of “fundamental overall problems.”⁵¹ An IAEA recommendation is very serious matter and points to inadequate conformance to IAEA Safety Requirements. It is defined as:

Advice on what improvements in operational safety should be made in the activity or programme that has been evaluated. It is based on inadequate conformance with the IAEA Safety Requirements and addresses the general concern rather than the symptoms of the identified concern. Recommendations are specific, realistic and designed to result in tangible improvements.⁵²

72.

At all material times the NNR has indicated that its mission is to foster compliance with the safety standards of the International Atomic Energy Association and international best practice. Hence the recommendations of the IAEA should be treated as reasonable measures that South Africa should conform to in order to ensure the safety of an inherently highly hazardous industry. The NNR website states:

The NNR is primarily mandated to monitor and enforce regulatory safety standards for the achievement of safe operating conditions, prevention of nuclear accidents or mitigation of nuclear accident consequences, resulting in the protection of workers, public, property and the environment against the potential harmful effects of ionizing radiation or radioactive material.

To fulfil its mandate, the NNR advocates the development and maintenance of appropriate regulatory frameworks for enforcing regulatory radiation safety standards

⁵⁰ International Atomic Energy Agency, SALTO, pg. 61

⁵¹ SALTO report page 12

⁵² SALTO report page 14, definitions

which are consistent with the recommendations of the International Commission on Radiation Protection (ICRP) and the International Atomic Agency (IAEA).⁵³

73.

An IAEA suggestion is a statement of how to improve safety:

A suggestion is advice on an opportunity for safety improvement not directly related to inadequate conformance with the IAEA Safety Requirements. It is primarily intended to make performance more effective, to indicate useful expansions to existing programmes and to point out possible superior alternatives to ongoing work.⁵⁴

74.

The IAEA SALTO report of 2022 flagged as a concern the monitoring system for the containment structure. Recommendation E-2 states that the plant should ensure full functionality of the containment structure monitoring system. This recommendation is intimately connected to Suggestion E-1: The plant should consider improving revalidation of time limited ageing analyses for concrete structures and Suggestion E-2: The plant should consider completing and implementing the ageing management programmes of civil structures, systems and components. The recommendation and the suggestions are all connected to the same fundamental problem: cracks and corrosion in the containment building, which would, if it holds up, prevent radiation and radioactive materials leaving the plant in the case of a serious accident.⁵⁵

75.

However the remedial work related to this recommendation will only be done at an indeterminate date in the future. Containment monitoring instrumentation (Linked to IAEA mission finding – Issue area E2) and Containment Integrated Leak Rate Testing were scheduled to be completed after LTO implementation.⁵⁶ Information critical to defence-in-

⁵³<https://nnr.co.za/about/introduction/#:~:text=The%20NNR%20is%20primarily%20mandated,environment%20against%20the%20potential%20harmful>

⁵⁴ id

⁵⁵ Id page 23

⁵⁶ LTO Safety Case page 211



depth will therefore not emerge until at least five years after the LTO authorisation was granted.

76.

(a) Integrated Leak Rate Testing (ILRT)

A further issue of concern regarding monitoring of the reactor is the integrated leak rate test, which was last undertaken in 2015.

77.

According to Eskom, the containment structures (HRX):

... were fitted with several online monitoring instrumentation sets which collectively form the EAU system. The system's monitoring equipment includes:

- Invar wires,
- Pendulums,
- Strain gauges,
- Thermocouples, and
- Dynamometers.⁵⁷

The purpose of monitoring instrumentation is confirmed by Eskom to be the following:⁵⁸

The monitoring equipment measures various parameters throughout the lifetime of the structures, specifically during:

- Commissioning,
- During Integrated Leak Rate Testing (ILRTs) which occurs 10-yearly, and
- Normal operation and In-service testing and monitoring.

These devices are used to monitor the structural behaviour of the HRX structures and can also be used to validate the predictions made during the design of the containment structures

78.

From the above, it is clear that:

⁵⁷ Containment Re-Analysis for Long-Term Operation, Pg. 10

⁵⁸ id

- (a) the containment monitoring system provides critical data to determine plant health and safety; and
- (b) the monitoring system places a significant role during an ILRT.

79.

It is common cause that Koeberg does not have a fully functional containment monitoring system and will not have until Outages 129 and 229. More specifically, the containment monitoring system will not be fully functional before Unit's 1 IRLT in 2025.

80.

Eskom documentation is similarly clear on the purpose of an ILRT⁵⁹ which is to demonstrate the intended safety function of the containment building.

Eskom performs Integrated Leak Rate Tests (ILRT) on the containment structures every 10 years (the previous was performed in 2015). During the ILRT, the internal pressure on the containment structures is increased to 400 kPa to mimic [loss of coolant accident] LOCA conditions.

The primary objective of the ILRT is intended to identify leakage from containment (verification that the leak-tight liner and apertures remain within acceptable leakage rates, based on code requirements). Secondly, it intends to place the containment in a design basis pressurised condition to verify the concrete support structure' behaviour.

81.

The latter purpose is dependent upon the containment monitoring system, which is not fully functional.

82.

It is clear that the NNR did not have the results of a recent ILRT, generated by a fully functional monitoring system, before it, as the last test took place in 2015. This is yet another instance where the NNR has authorised the extension of the operation of Unit 2 without having access to critical information which would have enabled it to in order to evaluate

⁵⁹ Containment Re-Analysis for Long-Term Operation, Pg. 89

whether the continued safe operation of the nuclear installation for the period of the long-term operation is demonstrated by Eskom, as envisaged in LTO regulation 3(3).

83.

(b) Submission

Until the containment monitoring system at the Koeberg NPS has been rectified the reactor does not have a fully functional containment structure monitoring system. However the NNR has authorised the continued operation of the Koeberg power station for a further 20 years without having access to critical safety information, and based on a Safety Case that fails to comply with the requirements of regulation 4(b). Moreover a false impression was created as to safety of Koeberg far into the future, as Eskom has incorrectly stated that:

“The SALTO assessment confirmed that the continued safe operation of Koeberg was supported, including LTO.”⁶⁰

84.

This was clearly not the case as Eskom only intends addressing the lack of a fully functional containment structure monitoring system after the authorisation for Koeberg’s LTO has been granted and around five years into the future.

85.

Without a fully functioning monitoring system it is not possible for Eskom to justify the continued safe operation of the reactor for the intended period of time, as it will not be able to at all times predict what is going on in the reactor. It is also questionable whether it will be able to undertake a comprehensive leak detection test, which is another critical component of establishing and ensuring reactor safety. Eskom was not in a position to present an analysis of containment safety to the NNR without this system, and hence its LTO Safety Case was not compliant with regulation 3(3), 4(b) and (c) and the NNR could not apply its mind to the issues that it must consider in terms of regulation 5 as is abundantly clear from

⁶⁰ Eskom, Public Information Document, pg. 3

the SALTO statement on safety consequences of an inadequate monitoring system. The authorisation of KNPS Unit 1 for a further 20 years was based on an LTO application that was non-compliant with the LTO regulations due to these deficiencies in the safety case, and is therefore unlawful and should be set aside.

86.

Only after the recommendations of the IAEA have been implemented in regard to a fully functional containment structure monitoring system will the NNR be in a position to consider a potentially compliant LTO application.

87.

3.3 NON-COMPLIANCE WITH LTO REGULATION 6(3)

The LTO regulations also set out requirements for program for long term operation which include that:

- 6(3) The licensee shall develop and implement a comprehensive programme for ensuring the safe Long-Term Operation of the nuclear installation beyond the time - frame established by the design limits in the current licensing basis or the nuclear installation

88.

Clearly this program must be in place for the operation of the KNPS beyond the time limits of the initial licence, and for compliance it should have been considered by NNR when it evaluated the application for LTO, as it is integral to ensuring safety for the long term period. However given the major repairs still to be undertaken, and which are also critical to defence-in depth discussed above, such a program could not feasibly have been presented to the NNR at that stage. In fact until these repairs are effected the safe operation of the nuclear installation cannot be guaranteed as explained above. Regulation 6(3) cannot therefore be complied with and the extension of the licence should never have been granted. It should be

set aside.

89.

4 GROUND OF APPEAL 2 – RELIANCE ON OUT-OF-DATE DOCUMENTS

The decision to authorize the operation of the KNPS Unit 1 for a further 20 years was based on an application containing a significant percentage of documents that were out-of-date. The decision of the NNR has therefore been based on irrelevant considerations and was not based on relevant considerations, as envisaged in section 6 of the Promotion of Administrative Justice Act.

90.

In its submission of 6 June 2024 to the NNR SAFCEI stated that new information disclosed 35 days prior to the closing date for final public comment on the LTO application was *“voluminous and contained a significant number of out-of-date documents, on which the Safety Case is based. Out-of-date information in licensing processes constitutes irrelevant considerations and its consideration will render the authorisation, if granted unlawful.”*⁶¹

91.

This submission is not recorded in the Public Participation Record compiled by the NNR and accepted on 11th July 2024. Therefore, no cognisance appears to have been taken by the NNR board when making its decision to grant the extension of the licence, that significant information before it pertaining to safety and safety management was out-of-date. Even if it did consider this fact, the out-of-date documentation would constitute irrelevant considerations in the licensing process, rendering it invalid.

92.

This appeal reiterates some of the submissions and submits a revised list of 52 out-of-date documents which formed part of the LTO application. They all pertain to safety of the reactor directly, or indirectly by being concerned with management systems which are integral to

⁶¹ SAFCEI submission June 2024

safety of the reactor. One of these documents was supposed to be reviewed in 2016.⁶² Another was updated in April 2024, indicating that Eskom can and has updated key documents after publication of the Safety Case. Continued reference to out-of-date documents in the safety assessment is unacceptable for the following reasons:

93.

Eskom's document review process is outlined in its Nuclear Document and Records Management Requirements document,⁶³ which states:

"1. Introduction Nuclear Safety and Quality manual, 238-8 requires the establishment of measures to control preparation, distribution and changes to documents that specify requirements and prescribe how activities important to safety and quality are executed. This standard outlines the documentation and records management process to be followed in managing Nuclear Operating Unit management system documents and records in accordance with Eskom corporate and regulatory standards and policies.

Managers must ensure that documents are reviewed and revised when changes are submitted, or when the document is due for review and finalised within the review time frame.

3.1 Principles a) Nuclear safety shall be the overriding factor in all aspects of documentation and records management within the NOU as defined in this document.⁶⁴

94.

The importance of up-to-date information in the evaluation of the application for LTO is highlighted by Eskom in its Nuclear Safety and Quality Manual⁶⁵ where it states that nuclear safety is the prime objective in management at Koeberg:

This document promotes nuclear safety as the primary objective of the Integrated Management System overriding all other demands and integrates the Safety Management System (SMS) and Quality Management System (QMS) into the framework of the Management System to ensure that Eskom's nuclear-related activities and the individuals involved achieve the required high standard of Nuclear Safety and Quality.⁶⁶

⁶² KSM-LIC-001_Requirements_for the_Control_of_Maintenance.pdf

⁶³ Document identifier: 238-6 Alternative Reference Number: KSA-011

⁶⁴ Eskom Nuclear document and records management requirement: Document Identifier: 238-6 Alternative Reference Number: KSA-011 dated 2023

⁶⁵ 238-8_Nuclear_Safety_and_Quality_Management_Manual.pdf 2020

⁶⁶ 238-8_Nuclear_Safety_and_Quality_Management_Manual.pdf 2020, Page 6

95.

The SALTO review of 2022 commented on the need to complete the review, however this had not taken place prior to the authorisation for LTO of Unit 1.

The (SALTO Review) team also provided recommendations and suggestions to further enhance the preparations for safe LTO, including that Eskom should:

- Comprehensively review and implement all plant programmes relevant for long term operation.⁶⁷

96.

During the LTO application process the public, including SAFCEI could not comment effectively given the scale of documentation that was out-of-date, and such documentation being actually or potentially relevant to nuclear safety. It is also not clear how the NNR could lawfully make a decision to extend the license of a nuclear reactor, based on reports that are up to eight years out-of-date. Out-of-date documents that formed part of the Safety Case, if considered without having been being updated, constitute irrelevant considerations in terms of the Promotion of Administrative Justice Act.⁶⁸ This principle, (in the context of an environmental impact assessment under the National Environmental Management Act⁶⁹) was recognised in the case of *Seafront for all and Another vs MEC, Environmental and Development Planning, Western Cape Provincial Government and Others ("Seafront")*.⁷⁰ Here the MEC's decision was based primarily on information contained in the final scoping report some 4½ years before the MEC took her decision. It was held that:

The information in the final scoping report ought to have been augmented by a comprehensive current environmental impact assessment. In failing to call for such updated assessment, the MEC took her decision on the basis of irrelevant considerations (information which was out of date and no longer correct), and failed to have regard to relevant considerations.

97.

It is submitted the decision to authorise the extension of the licence for Unit 1 of the KNPS in

⁶⁷ <https://www.iaea.org/newscenter/pressreleases/iaea-concludes-long-term-operational-safety-review-of-south-african-koeberg-nuclear-power-plant>

⁶⁸ Section 6(2)(e)(iii)

⁶⁹ 107 of 1998

⁷⁰ (2010) JOL 25602 (WCC).

the circumstances was non-compliant the Promotion of Administrative Justice Act⁷¹ since it was based on a significant number of out-of-date documents which constituted irrelevant considerations in terms of section 6 of the Act, and as a consequence, relevant considerations were not considered.

98.

The variation of the license to permit 20 further years of operation for Unit 1 of the KNPS should accordingly be set aside and the LTO application should not be reconsidered until all relevant documentation is up-to-date and the scheduled Periodic Safety Review has been completed.






















99.

List of out-of-date documents:

⁷¹ Section 6(2)(e)(iii)

-  32-83_Eskom_Nuclear_Management_Policy.pdf
-  32-226_Requirement_and_Rules_for_R...and_the_Safety_of_Radiation_Source.pdf
-  32-1034_Eskom_Procurement_and_Supply_Chain_Management_Procedure.pdf
-  36-1518_Nuclear_Safety_Oversight_in_Eskom.pdf
-  238-6_Standard_for_Nuclear_Documen...ecords_Management_Requirements.pdf
-  238-8_Nuclear_Safety_and_Quality_Management_Manual.pdf
-  238-19_Generation_Division_Radiation_Protection_Manual.pdf
-  238-34_Optimisation_of_Radiation_Protection.pdf
-  238-35_Radiation_Protection_Dose_and_Risk_Limits.pdf
-  238-38_Radiation_Protection_Requirem...Baggage_Inspection_X-Ray_Devices.pdf
-  238-40_Radiation_Protection_Requirements_for_Industrial_Radiography.pdf
-  238-42_Radiation_Dosimetry_Requirements.pdf
-  238-43_Requirements_for_Radiation_Workers.pdf
-  238-44_Requirements_for_Radiological_Surveillance_Instrumentation.pdf
-  238-46_Requirements_for_the_Safety_...and_Control_of_Radioactive_Sources.pdf
-  238-48_Thermoluminescence_Dosimetry_Requirements.pdf
-  238-49_Liquid_and_Gaseous_Effluent_Management_Requirements_for_KNPS.pdf
-  238-54_Radiation_Protection_Licensin...for_Koeberg_Nuclear_Power_Station.pdf
-  238-101_Quality_and_Safety_Managem...ments_for_Nuclear_Supplier_Level_1.pdf
-  238-219_Level_1_Supplier_Safety_Cultu...nt_Programme_SCEP_Requirements.pdf
-  240-64602879_Nuclear_Operating_Unit_Structure_and_Mandates.pdf
-  240-113228853_Koeberg_Solid_Radioactive_Waste_Management_Plans.pdf
-  240-119744497_Control_of_the_Safety_Analysis_Report_KAA-697.pdf
-  240-123782330_NOU_Workforce_Plan.pdf
-  240-131691121_Internal_and_External_Communications_Procedure.pdf
-  240-143604773_Safety_Screening_and_Evaluation_Process_KAA-709.pdf
-  240-148905483_Groundwater_Protection_Programme_Requirements_Manual.pdf
-  240-156938857_Human_Resources_Po...Strategy_for_Long-Term_Operation.pdf
-  331-3_Nuclear_Engineering_Documen...ords_Management_Work_Instruction.pdf
-  331-144_Standard_for_the_Preparation_of_an_Equivalency_Study.pdf
-  331-148_Programme_Engineers_Guide.pdf
-  KAA-501_Project_Management_Proces...uclear_Power_Station_Modifications.pdf
-  KAA-584_Radiation_Instrument_Management.pdf
-  KAA-595_Control_of_Chemistry_Instrumentation_Analysers_and_Equipment.pdf



-  KAA-632_ALARA_Programme.pdf
-  KAA-634_Responsibilities_for_the_Radioactive_Material_Control_Programme.pdf
-  KAA-637_Access_Control_to_Radiological_Controlled_Zones.pdf
-  KAA-640_Control_of_Items_Leaving_Site_for_Repair_or_Service_Rev_7.pdf
-  KAA-688_Corrective_Action_Process.pdf
-  KAA-721_Online_Work_Management_Process.pdf
-  KAA-865_Human_Performance_Programme.pdf
-  KAA-913_Integrated_Equipment_Reliability_Process.pdf
-  KGH-004_Radiation_Protection_Manag...of_Operating_Experience_Feedback.pdf
-  KGH-010_Radiation_Protection_Response_to_Incidents_or_Alarms.pdf
-  KSA-055_Requirements_for_the_Medic...urveillance_and_Control_Programme.pdf
-  KSA-122_Human_Performance_Tools.pdf
-  KSA-913_Integrated_Equipment_Reliability_Standard.pdf
-  KSC-003_The_Chemistry_Programme.pdf
-  KSH-010_Functional_Responsibilities_fo...tection_at_Koeberg_Operating_Unit.pdf
-  KSH-012_Radiation_Protection_Standards_and_Expectations.pdf
-  KSM-LIC-001_Requirements_for_the_Control_of_Maintenance.pdf
-  KWH-AL-004_Radiation_Protection_For...riteria_Actions_and_Documentation.pdf
-  KWH-S-007_Leakage_Tests_on_Sealed_Radioactive_Sources.pdf
-  KWH-S-048_Signposting_and_Barricading_in_Radiological_Controlled_Zones.pdf
-  KWW-TES-003_Encapsulation_of_Radio...e_Water_Filters_in_Concrete_Drums.pdf

100.

5 GROUND OF APPEAL 3: THE GRANTING OF A 20 YEAR EXTENSION OF LIFE FOR THE KNPS UNIT 1 IS UNCONSTITUTIONAL AND IRRATIONAL

It is submitted that the authorisation of Unit 1 of the KNPS to continue operating for a further 20 years is unlawful, for failure to comply with the NNR Act and LTO regulations. It is also an unreasonable measure as contemplated in terms of section 24 of the Constitution⁷² and therefore unconstitutional, and is irrational, for the following reasons:

⁷² Section 24 of the South African Constitution states that everyone has the right

- c) To an environment that is not harmful to their health and well being; and
- d) To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that
 - (iv) Prevent pollution and ecological degradation.
 - (v) Promote conservation; and
 - (vi) Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development



101.

(a) Unlawfulness

As set out above the granting of the authorisation is unlawful given that the Eskom safety case on which the LTO application was based did not comply with regulations 3(3), 4, 5, and 6(3) of the LTO regulations.

102.

(b) Constitutionality - unreasonableness

When considering whether a licensing decision complies with section 24 of the Constitution, the meaning of 'reasonable' in the particular context must be interpreted, with regard being had to international law.⁷³ This would include the safety standards of the IAEA given that South Africa is a member state of the International Atomic Energy Agency (IAEA) and has ratified the Convention on Nuclear Safety. This approach is accepted by the NNR which states on its website:

South Africa is a member state of the International Atomic Energy Agency (IAEA) and has ratified the Convention on Nuclear Safety. The conventions place certain obligations on member states to implement measures aimed at ensuring nuclear safety. The NNR Safety Standards are premised on international standards such as the IAEA Safety Standards, the UK NII Safety Principles and the WENRA Reference levels.⁷⁴

103.

The IAEA Safety Standards⁷⁵ provide a robust framework of fundamental principles, requirements, and guidance to ensure safety. They reflect an international consensus and serve as a global reference for protecting people and the environment from the harmful effects of ionizing radiation. A recommendation of the SALTO mission is in effect advice that the reactor does not comply with IAEA standards.⁷⁶

⁷³ Constitution, section 39(1)

⁷⁴ NNR website: <https://nnr.co.za/about/policy-and-legislation/>

⁷⁵ <https://www.iaea.org/resources/safety-standards>

⁷⁶ SALTO report page 14, definitions: A recommendation is advice on what improvements in operational safety should be made in the activity or programme that has been evaluated. It is based on inadequate conformance with the IAEA Safety

104.

The 2022 SALTO mission reviewed the status of activities related to long term operation (LTO) of the plant against IAEA Safety Standards and international best practices.⁷⁷

The status of the 2022 IAEA SALTO report was given as follows:

- The IAEA SALTO peer review is a comprehensive safety review directly addressing strategy and key elements for the safe long-term operation of nuclear power plants. The evaluation of programmes and performance is made on the basis of the IAEA's Safety Standards and other guidance documents.⁷⁸

“The objective was to review the status and future plans for safe LTO programmes and activities performed at the plant with comparison to the relevant IAEA Safety Standards, guidance documents and internationally accepted practices and to provide recommendations and suggestions for improvement of the preparations for safe LTO.

105.

The state of the KNPS was found by the 2022 SALTO mission to fall short of the IAEA standards, particularly as the containment structure monitoring system is not fully functional.⁷⁹ It commented that that many activities are still in progress to achieve full compliance.⁸⁰

106.

The regulatory purpose of the NNR in licensing the reactor for a further period is to protect the public, property and the environment.⁸¹ A reasonable measure, in the context of the licensing of a nuclear power station to operate beyond the expiry date of the initial license must be formulated after considering international law. At the very least the NNR was required to consider the IAEA safety standards, and their application to the KNPS, as well as recommendations of the IAEA review undertaken by the SALTO panel in 2022, as to

Requirements and addresses the general concern rather than the symptoms of the identified concern. Recommendations are specific, realistic and designed to result in tangible improvements

⁷⁷ SALTO report executive summary page 9

⁷⁸ <https://www.iaea.org/services/review-missions/safety-aspects-of-long-term-operation-salto>

⁷⁹ id

⁸⁰ SALTO report page 16

⁸¹ NNR Act, preamble and Objects – section 5

compliance with these standards in order to achieve safety. This is especially so given the NNR commitment to achieving IAEA compliance and its acknowledgement that "The NNR Safety Standards are premised on international standards such as the IAEA Safety Standards..."⁸²

107.

However this has not taken place.

108.

The SALTO report commented on the consequences for reactor safety of continuing without a fully functional containment monitoring system. It stated:⁸³

Without a fully functional containment monitoring system, the data required to demonstrate structural integrity of the containment during LTO may not be sufficient. The team made a recommendation in this area (issue E-2).

2.2 – SAFETY CONSEQUENCE: Without a fully functional containment monitoring system, not all necessary data for the containment structure will be available to demonstrate the intended safety function during LTO.⁸⁴

109.

The report recommended that the plant should ensure full functionality of the containment structure monitoring system.⁸⁵ However this recommendation has been left to be implemented at an indeterminate date some 5 years hence, during outages 129 and 229 the date of which to be determined at the sole discretion of Eskom.⁸⁶ An authorisation to continue operations in these circumstances cannot be regarded as reasonable, and is therefore unconstitutional.

110.

Not only is it unconstitutional for failure to have proper regard to these standards but because it fails to ensure the protection of public safety. The constitution says everyone has the right

⁸² NNR website: <https://nnr.co.za/about/policy-and-legislation/>

⁸³ jd

⁸⁴ SALTO report page 61

⁸⁵ Id page 62

⁸⁶ NNR directive 19 July 2024

to an environment that is not detrimental to health and well being. However the LTO authorisation permits the plant to operate in circumstances and in a state where the IAEA has identified that this could have significant consequences for safety.

111.

Without a fully functioning monitoring system for the next five years until the planned outage means that the ability to take evasive action is compromised if abnormal conditions arise, as stated in the SALTO report:⁸⁷

The operating organization shall establish surveillance programmes for ensuring compliance with established operational limits and conditions and for detecting and correcting any abnormal condition before it can give rise to significant consequences for safety.

112.

South Africa is clearly in breach of duties and practices that it aspires to comply with under international law, and its authorisation of the further 20 years of operation of Unit 1 disregards international law. Under the circumstances it is unreasonable and unconstitutional.

113.

Leak test

An up to date leak detection test was also not completed prior to authorisation and the repairs to the reactor vessel not undertaken. The authorisation has allowed these matters to be addressed after authorisation, indicating that the plant can continue to operate where the regulator does not have information as to the state of the containment building and internal pressure and temperature on a day-to-day basis.

⁸⁷ International Atomic Energy Agency, SALTO, pg. 61

114.

Failure to comply with international best practice.

In addition the decision is unreasonable as the time period (20 years) granted for extended operation is excessive and unjustifiable when considered against international best practice. The NNR aspires to international best practice as is evident from its website and the Periodic Safety Assessment that takes place every 10 years in accordance with the KNPS Nuclear Installation Licence.⁸⁸ The latest PSA took place over the period 2019–2021 in fulfilment of this 10-yearly regulatory requirement.⁸⁹ The stated objectives of the PSA include:⁹⁰

b) The extent to which KNPS conforms to modern codes, standards, and good practices, to ensure that the currently adopted codes, standards, and practices are not obsolete and do not pose a nuclear safety risk for KNPS;

115.

International best practice for reactors of the type of the KNPS is applied in France, which does not provide for extension of licenses for periods of more than 10 years to any license. Permits to operate nuclear facilities are issued by the French Government after consulting ASN⁹¹(English=NSA). The facility undergoes an in-depth "periodic safety review" every ten years to assess the conditions for continued operation of the facility for the following ten years.⁹² The practice in South Africa should follow this approach in order to be reasonable.

116.

The granting of a 20 year extension of life when there are as yet unresolved matters relating to safety, including those critical to defense-in-depth is unreasonable is not a reasonable measure as envisaged under section 24 of the Constitution,

117.

The NNR decision to vary the license so as to authorize 20 further years of operation for Unit

⁸⁸ (NIL-01 (Variation 19) [5]),

⁸⁹ https://www.eskom.co.za/wp-content/uploads/2024/05/331_607_KNPS_3rd_Periodic_Safety_Review_Final_Report.pdf

⁹⁰ PSR paragraph 4.1

⁹¹ The Autorité de sûreté nucléaire (English: Nuclear Safety Authority, ASN) is an independent French administrative authority set up by law 2006-686 of 13 June 2006 concerning nuclear transparency and security. It has replaced the General Direction for Nuclear Safety and Radioprotection. - Wikipedia

⁹² "ASN issues a position statement on the conditions for continued operation of the 900 Mwe reactors beyond 40 years." <https://www.french-nuclear-safety.fr/asn-informs/news-releases/900-mwe-reactors-beyond-40-years>

1 of the KNPS should thus be set aside on the basis of failing to comply with the mandatory constitutional requirement of being a reasonable measure.⁹³

118.

(c) Rationality

Failure to follow expert recommendations

Eskom's failure to complete the repairs to the reactor containment vessel and containment structure monitoring system prior to the NNR considering the LTO application has resulted in the authorisation being unreasonable, because it fails to assure the public of safety, defense-in-depth, and because to date the recommendations and warnings of Eskom's own expert panel and engineers over a 10 year period have not been implemented

119.

The purpose for which the power to authorize nuclear power stations is granted to the NNR is the protection of persons, property and the environment against nuclear damage when licensing an inherently highly hazardous industry.⁹⁴

120.

Licensing decisions, made by applying safety standards and regulatory practices such as the LTO regulations and recommendations of the IAEA, are at the heart of protecting persons property and the environment from nuclear damage.

⁹³ Constitution section 24

⁹⁴ Act 47 of 1999

The preamble to the NNR Act states that the purpose of the NNR is

To provide for safety standards and regulatory practices for protection of persons, property and the environment against nuclear damage; and to provide for matters connected therewith.

The NNR Act states the objects of the regulator are to

(a) provide for the protection of persons, property and the environment against nuclear damage through the establishment of safety standards and regulatory practices;

(b) exercise regulatory control related to safety over-

(i) the siting, design, construction, operation, manufacture of component parts, and decontamination, decommissioning and closure of nuclear installations; through the granting of nuclear authorisations;

121.

The LTO application presented a safety case that could not comply with LTO regulations 3, 4, and 6(3) largely due to Eskom's failure to timeously effect repairs to the reactor containment and monitoring systems that are critical to defense-in-depth. As a consequence, it could not feasibly present a program for the safe functioning of the reactor after the expiry of the initial license and for the long term as required by regulation 6(3) of the LTO regulations. It is concerning that this took place after the IAEA in its SALTO mission of 2022 had drawn attention to significant concerns regarding reactor safety if these matters were not timeously rectified, and this had been drawn to Eskom's attention seven years prior thereto in 2015. In addition, the LTO application contained a significant number of out-of-date documents, as a consequence of which the NNR applied its mind to irrelevant considerations and failed to consider relevant considerations.

122.

Notwithstanding all these deficiencies the NNR granted the 20 year extension of operating life to Unit 1 of the KNPS. Eskom has had more than adequate time to completed the repairs that would potentially have put it in a position to generate a compliant Safety Case and safety program, but failed to do so. The repairs to aspects of the reactor that are critical to defense-in-depth will take place a year after the date on which the extension of the license was granted, but a fully functioning containment monitoring system, which is also critical to defense-in-depth remains to be repaired at an indeterminate date in at least five years' time, at the discretion of Eskom. The NNR and the public therefore cannot be assured that by a certain date these repairs, that are critical to defense-in-depth, will have been effected and tested. The granting of the license therefore fails to provide the necessary protection to persons property and environment against nuclear damage.

123.

In light of these fundamental deficiencies the decision of the NNR to license the LTO of Unit 1 of the KNPS can only be described as an exercise of power that is not rationally connected to the purpose for which the power to license is granted to the NNR - which is to provide for the protection of persons, property and the environment against nuclear damage through the establishment of safety standards and regulatory practices such as would be exercised

during licensing. It is therefore irrational.

124.

The appeal should be upheld and the authorisation to operate Unit 1 of the KNPS for a further 20 years should be set aside.

DATED AT CAPE TOWN THIS 10TH DAY OF SEPTEMBER 2024



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